Author: Melvyn Rubenfire, M.D., 2009

License: Unless otherwise noted, this material is made available under the terms of the Creative Commons Attribution – Share Alike 3.0 License: http://creativecommons.org/licenses/by-sa/3.0/

We have reviewed this material in accordance with U.S. Copyright Law and have tried to maximize your ability to use, share, and adapt it. The citation key on the following slide provides information about how you may share and adapt this material.

Copyright holders of content included in this material should contact open.michigan@umich.edu with any questions, corrections, or clarification regarding the use of content.

For more information about how to cite these materials visit http://open.umich.edu/education/about/terms-of-use.

Any medical information in this material is intended to inform and educate and is not a tool for self-diagnosis or a replacement for medical evaluation, advice, diagnosis or treatment by a healthcare professional. Please speak to your physician if you have questions about your medical condition.

Viewer discretion is advised: Some medical content is graphic and may not be suitable for all viewers.
Citation Key
for more information see: http://open.umich.edu/wiki/CitationPolicy

Use + Share + Adapt

{ Content the copyright holder, author, or law permits you to use, share and adapt. }

- **Public Domain – Government**: Works that are produced by the U.S. Government. (17 USC § 105)
- **Public Domain – Expired**: Works that are no longer protected due to an expired copyright term.
- **Public Domain – Self Dedicated**: Works that a copyright holder has dedicated to the public domain.
- **Creative Commons – Zero Waiver**
- **Creative Commons – Attribution License**
- **Creative Commons – Attribution Share Alike License**
- **Creative Commons – Attribution Noncommercial License**
- **Creative Commons – Attribution Noncommercial Share Alike License**
- **GNU – Free Documentation License**

Make Your Own Assessment

{ Content Open.Michigan believes can be used, shared, and adapted because it is ineligible for copyright. }

- **Public Domain – Ineligible**: Works that are ineligible for copyright protection in the U.S. (17 USC § 102(b)) *laws in your jurisdiction may differ

{ Content Open.Michigan has used under a Fair Use determination. }

- **Fair Use**: Use of works that is determined to be Fair consistent with the U.S. Copyright Act. (17 USC § 107) *laws in your jurisdiction may differ

  Our determination **DOES NOT** mean that all uses of this 3rd-party content are Fair Uses and we **DO NOT** guarantee that your use of the content is Fair.

  To use this content you should **do your own independent analysis** to determine whether or not your use will be Fair.
Nutrition and Cardiovascular Disease

Melvyn Rubenfire MD
Professor of Internal Medicine
Division of Cardiovascular Medicine
Director of Preventive Cardiology

Fall 2009
Nutrition and Cardiovascular Diseases-

- Dietary abuse and heart disease
  - Anorexia, obesity, alcohol,
- Congestive heart failure
- Atherosclerotic CV Disease
  - prevent and reduce progression of atherosclerosis
  - reduce MI, stroke, cardiac death, sudden death
- Cardiac risk factors:
  - LDL-C, insulin, VLDL-C, triglycerides, HDL-C, glucose, metabolic syndrome
- Hypertension
Good nutrition and CV disease—what it is!

- Maintain ideal body weight
- Adequate vitamins and minerals
- Fruits, vegetables, grains, nuts, fibers
- Fish
- Low or non fat dairy
- Monounsaturated fats
- Alcohol in moderation
- Limited salt
Case anorexia nervosa

29 year old woman has practiced law for several years. Complains of palpitations each night on going to bed, and lightheadedness after exercise. She works out for about 90 minutes each day on treadmill and weights. Menstrual cycle has been irregular for years.

BP  90/50 mmHg, HR 80 bpm

Ht 5’ 6”, Wt 95 lbs. Facial skin drawn. Very lean and muscular, scaphoid abdomen with no body fat stores.
Anorexia nervosa - clinical profile

• Primarily young women
• on very low fat and low calorie diets to lose weight to maintain self image of thin
• may exercise to excess
Cardiac effects of anorexia nervosa

- Myocardial fibrosis and atrophy
- Unstable BP
- Complex arrhythmia’s including sudden death
Case obesity heart disease

42 year old obese man referred to cardiology for shortness of breath, fatigue, and pre-syncope. Long standing obesity: at age 15 - 240lbs, at 25 yrs - 290 lbs, and presently 5’9” 351lbs. Eats about 6000 calories per day and 10-12 grams of salt. Fired from job because of falling asleep at work.

PE: Loud sonorous breathing, drowsy, facial flushing. BP 180/100 mmHg with large cuff, HR 110 bpm, respiration shallow 24/min, facial plethora, bilateral rhonchi, distant heart sounds, morbid generalized and trunkal obesity with large panus, minimal leg edema,

Hgb 20.2 g/dl, Hct 61%, arterial p02 - 55mmHg, and 02 sat 88%
Cardiovascular effects of obesity

• Effects of obesity on CV risk
  – Hypertension
  – Diabetes
  – Low HDL
  – when central or abdominal is associated with the metabolic syndrome

• Obesity heart disease
  – Sleep disordered breathing
  – Cardiomyopathy
Figure 1. Obesity, cardiac failure, and the beneficial role of bariatric surgery. RV indicates right ventricular; LV, left ventricular.
Impact of weight loss on atherosclerotic risk in obesity

Figure 2. Mechanisms of atherosclerosis and the beneficial role of bariatric surgery. ICAM-1 indicates intercellular adhesion molecule-1; PAI-1, plasminogen activator inhibitor-1.
35 year man was old found lying on his apartment floor by his sister, stuporous, and hyperventilating.

History of alcoholism since teens. In ER admits to 1 to 2 fifths of gin daily and not much food other than taco chips.

Mildly confused, tremulous, and hyperventilating. Cachexia with loss of muscle mass.

BP 150/50, HR 120, increased JVP, lung rales, diffuse sustained apical impulse, loud S3 gallop, ascites, liver enlarged and tender, edema of legs, scrotum, and buttocks.
Cardiovascular complications of alcohol

- Direct toxin or myocardial depressant
- Cardiomyopathy
  - CHF
  - Can be acute CHF
- Arrhythmia’s
  - atrial fibrillation - holiday heart
  - PVC, Ventricular tachycardia, ventricular fibrillation
- Hypertension
Facts regarding alcohol as a food source

- Alcohol has 7 cal/gram
- 86 proof spirits is 43% ethanol or 43 gram/100cc
- Wine is 12% ethanol or 12 gram/100cc
- Beer is 5% ethanol or 5 gram/100cc
- 12 oz bottle of beer is 360 cc or 18 gm = 126 calories
- 1.5 oz of whiskey is 45 cc or 19 gm = 133 calories
- 4 ounces or 120 cc of wine or 14 gm = 98 calories
- 1 pint of whiskey = 480 cc = 1450 calories
Is alcohol beneficial in coronary prevention?  

*The French Paradox*

- Moderate amounts of alcohol are associated with decreased coronary event rates
  - increase in HDL-C
- Benefits may be offset by increased total mortality from
  - accidents, liver disease, strokes, and cancer
Case Congestive Heart Failure

61 y.o. man with HTN and a previous myocardial infarction is in CHF. His LVEF is 30% and there is no surgical or PCI option. Present treatment includes ACEi, digoxin, diuretics, ASA, and a beta blocker.

Despite appropriate drugs he is edematous and SOB with minimal activity.

What are the possible problems?

Solutions?
Nutrition complications in CHF

- In CHF, excess salt and water intake resulting in increasing intra-vascular volume and decrease myocardial contractility and output
- anorexia, malnutrition, muscle wasting
Nutrition and CHF

• Restrict salt intake
  – no added salt is about 2 gm Na\(^+\) or 5 gm salt
  – use potassium chloride as a salt substitute
  – encourage potassium and magnesium food sources or supplements in patients on diuretics

• Fluid intake about 1cc per kcal or 1500-2000cc/day

• in IV fluids administration
  – 1000 ml of 0.9N% NaCl contains 9 gm of NaCl
Gesunde Vitamine für Raucher:

SMOKER’S SPECIAL

Neu: Nur in Apotheken

Raucher Vitamine

Vitamin-Kapseln speziell für Raucher, für den meist erhöhten Vitaminbedarf:

Thiamin  B2+  B12  C  E  Fol. säure

Vitamine fördern die Gesundheit
Micronutrient supplements, roots, and herbs and cardiovascular disease

- Anti-oxidants
  - evidence of benefit from enriched diets (decrease CV mortality, re-infarction, sudden death, strokes, but not for supplements of vit E, vit C, or beta carotene
  - Vitamin E has been shown to increase CHF and may reduce beneficial effect of niacin given to raise HDL-C
  - iron may be pro-atherogenic

- Marine omega-3 fatty acids are protective in CHD
- Vitamin D “appears” to be a CVD risk factors
- Green tea-polyphenols, dark chocolate-bioflavenoids
Figure 2. Hypothetical associations between vitamin D insufficiency and cardiovascular disease. MGP indicates matrix Gla protein; RAS, renin-angiotensin system. Adapted with permission from Zittermann et al.\textsuperscript{11} Copyright © 2005, Cambridge University Press.
NCEP ATP III: Therapeutic Lifestyle Changes in LDL-Lowering Therapy

**Major Features**

- **TLC Diet**
  - Reduced intake of cholesterol-raising nutrients
    - Saturated fats <7% of total calories
    - Dietary cholesterol <200 mg per day
  - LDL-lowering therapeutic options
    - Plant stanols/sterols (2 g per day)
    - Viscous (soluble) fiber (10–25 g per day)

- **Weight reduction**
- **Increased physical activity**
### Typical American Diet and Cholesterol Lowering Diets

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Typical American Diet</th>
<th>Population At Risk</th>
<th>At Risk TLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat</td>
<td>34 - 37%</td>
<td>&lt; 30%</td>
<td>&lt; 30% (25-35%)</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>12 - 14%</td>
<td>8 - 10%</td>
<td>&lt; 7%</td>
</tr>
<tr>
<td>MUFA</td>
<td>14%</td>
<td>&lt; 15%</td>
<td>&lt; 20%</td>
</tr>
<tr>
<td>PUFA</td>
<td>7%</td>
<td>&lt; 10%</td>
<td>&lt; 10%</td>
</tr>
<tr>
<td>Vegetable Fat</td>
<td>40%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>46%</td>
<td>50 - 60%</td>
<td>50 - 60%</td>
</tr>
<tr>
<td>Protein</td>
<td>16%</td>
<td>15 - 20%</td>
<td>15 - 20%</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>300 - 400 mg</td>
<td>&lt; 300 mg</td>
<td>&lt; 200 mg</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>12 - 18 g</td>
<td>20 - 30 g</td>
<td></td>
</tr>
<tr>
<td>high</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td>little</td>
<td>2X</td>
<td>2X</td>
</tr>
<tr>
<td>Calories</td>
<td></td>
<td>TO MAINTAIN HEALTHY WEIGHT</td>
<td></td>
</tr>
</tbody>
</table>
Photograph of butter with a sign saying “89 gms fat” removed
Pizza – 12 gms fat
Taco – 11 gms fat
Fried Chicken – 17 gms fat
French Fries – 14 gms fat
Soda – 10 gms fat
Randy Glasbergen
”...broiled skinless chicken...” cartoon removed

Original image here: www.glasbergen.com
Types of Fat

- Saturated fatty acids
  - Trans-fatty acids
- Monounsaturated fatty acids (MUFA)
- Polyunsaturated fatty acids (PUFA)
  - Omega-6 fatty acids
  - Omega-3 fatty acids
Fig 2 Fatty acids are saturated, monounsaturated, or polyunsaturated. Two types of polyunsaturated fatty acid exist—the omega 6 and the omega 3 fatty acids. The omega 6 fatty acids are available mainly from vegetable oils. Three types of omega 3 fatty acid exist: α linolenic acid is available from certain plants but eicosapentanoic acid and docosahexanoic acid must be obtained from marine sources.
Saturated Fat

• Saturated fat is the most important food substance that raises serum cholesterol.
• Solid at room temperature.
• Animal derived with the exception of the “tropical” oils, i.e., coconut, palm, and palm kernel oil.
• Typical American diet: 12-14% of total calories from saturated fat.
**Preventive Cardiology**

**Structure of Cis and Trans Fatty Acids**

Cis double bond: oleic acid

Trans double bond: elaidic acid
Substitute Lean Protein for Fatty Protein
Switch to Nonfat Dairy
Comparison of Dietary Fats to Rykoff-Sexton H.D.L. Canola Oil

<table>
<thead>
<tr>
<th>DIETARY FAT</th>
<th>Saturated Fat</th>
<th>Polyunsaturated Fat</th>
<th>Monounsaturated Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.D.L. Canola oil</td>
<td>0%</td>
<td>0%</td>
<td>58%</td>
</tr>
<tr>
<td>Safflower oil</td>
<td>0%</td>
<td>25%</td>
<td>10%</td>
</tr>
<tr>
<td>Sunflower oil</td>
<td>0%</td>
<td>75%</td>
<td>10%</td>
</tr>
<tr>
<td>Corn oil</td>
<td>0%</td>
<td>75%</td>
<td>10%</td>
</tr>
<tr>
<td>Olive oil</td>
<td>0%</td>
<td>75%</td>
<td>10%</td>
</tr>
<tr>
<td>Soybean oil</td>
<td>0%</td>
<td>75%</td>
<td>10%</td>
</tr>
<tr>
<td>Peanut oil</td>
<td>0%</td>
<td>75%</td>
<td>10%</td>
</tr>
<tr>
<td>Cottonseed oil</td>
<td>0%</td>
<td>75%</td>
<td>10%</td>
</tr>
<tr>
<td>Lard</td>
<td>12%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Palm oil</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Beef tallow</td>
<td>14%</td>
<td>84%</td>
<td>0%</td>
</tr>
<tr>
<td>Butteroil</td>
<td>33%</td>
<td>27%</td>
<td>2%</td>
</tr>
<tr>
<td>Coconut oil</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Lowfat protein source

Omega-3 fatty acids
Fish Oil Mechanism

• Non lipid effects of EPA/DHA
  – Dose 850-1000mg
  – Improves endothelial cell function
  – Inhibits platelet aggregation
  – Lowsers blood pressure
  – Anti-inflammatory (plaque stability?)
  – Reduces cardiac dysrhythmias

• Lipid effects-high doses (4gm)
  – Reduces triglycerides
CHOLESTEROL
Photograph of various foods with associated calories removed
Mediterranean vs Low Fat diet for 12 weeks in high risk adults

Figure 2. Changes from baseline in plasma concentrations of the inflammatory biomarkers in the 3 intervention groups.

- Similar wt loss and lowering of LDL-C
- Greater decrease in FBS, insulin, trigs, chol/HDL
- Greater rise in HDL-C

Mediterranean Diet—fiber, fish, olive oil

Adapted from Consumer Reports 1994
Mediterranean Diet—fiber, fish, olive oil

See: Mediterranean Diet Pyramid
Soluble Fiber Sources

Whole Grain Breads
Flours
Cereals
Peas
Beans
Fruits
Vegetables
Why Soluble Fiber?

• Meta-analysis of 67 clinical trials found various forms ↓LDL-C by 2.2 mg/dl per gram.
• No significant changes in HDL-C, TG
• Forms: pectins (apple), psyllium (Metamucil™), and oats, dried beans and peas, fruits, vegetables
• Dose: 10 - 25 g/day

Soluble Fiber
Mechanism Of Action

• Fiber binds bile salts in the GI tract
• Cholesterol removed from serum for bile acid synthesis in an effort to restore bile acid pool
• Promotes synthesis of short chain fatty acids via fermentation in the colon. SCFA’s inhibit hepatic cholesterol synthesis
• Tendency towards lower fat diets
• Reduces inflammatory cytokines
Plant Stanol Esters: The Evidence

- Over 20 published studies support stanol ester effects.
- Reduces cholesterol absorption.
- Cholesterol-lowering effect of plant stanols:
  - TC is lowered by up to 10%
  - LDL-C is lowered by up to 14%
  - HDL-C & TG are unaffected
## Average 2000 Kcal Diet

<table>
<thead>
<tr>
<th>CARBOHYDRATE*</th>
<th>PROTEIN*</th>
<th>FAT**</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 60% kcal</td>
<td>15 - 20% kcal</td>
<td>25 - 30 % kcal</td>
</tr>
<tr>
<td>250 - 300 g</td>
<td>75 - 100 g</td>
<td>55 - 67 g</td>
</tr>
</tbody>
</table>

- 2 cups of milk
- 3-4 fruits
- 6 ounces lean meat
- 11 ounces of starches
- 3-4 vegetables
- 6 teaspoons of fat

* 4kcal/gm  ** 9kcal/gm = dense calories
Recommendations in a Nutshell

• Give advice on what to eat, not only what not to eat
• Stretch small amounts of lean meat over large amounts of vegetables
• Use vegetables and legumes as the main entree
• Choose non-fat dairy products
• Limit added fats and oils, emphasize olive oil, lecithin oil such as Pam™ for ‘frying pan’
Case: Primary Prevention

MS is a 24 y.o. medical resident whose father recently had an MI at age 49. PMH is unremarkable. No time for exercise. ‘I eat most of my meals in the hospital cafeteria.’

Height = 68 inches   Weight = 190 lb
BMI = 29 kg/m$^2$   Waist = 40 inches
Chol 279, HDL-C 65, trigs 81, LDL-C 197mg/dl

Rx: 2500-2700 kcal for maintenance
    2000-2200 kcal for weight loss
Resident--Initial  24 hour recall

2 strawberry toaster strudels with frosting
  double café latte with skim milk
  1 milky way
  1 Wendy’s Jr bacon cheeseburger
  Biggie fries
  Caesar side salad, 1/2 pkt dressing
  medium coke
  1 pita with lettuce, tomato, cheese and dressing
  12 ounces hard cider
Resident
24 hour recall

2840 kilocalories
46% CHO  12% protein  38% fat  4% ETOH
12% saturated fat
140 mg cholesterol
18 g dietary fiber
4110 mg sodium
Resident--Heart Healthy

1 1/2 cups cheerios with skim milk toast with 2T peanut butter
1 cup orange juice
cappuccino with skim milk banana
Wendy’s baked potato with small chili
Side Caesar salad with dressing
medium coke
pita with lettuce, cheese, turkey, mushrooms, tomato
olive oil dressing
hard cider and 1 1/2 oz peanuts
Resident
24 hour recall

2784 kilocalories
52% CHO  16% protein  28% fat
4% ETOH
6% saturated fat
105 mg cholesterol
44 g dietary fiber
4744 mg sodium
24 y.o. Resident

<table>
<thead>
<tr>
<th></th>
<th>9/30</th>
<th>10/23</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>279</td>
<td>217</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>81</td>
<td>103</td>
</tr>
<tr>
<td>HDL-C</td>
<td>65</td>
<td>49</td>
</tr>
<tr>
<td>LDL-C</td>
<td>197</td>
<td>147</td>
</tr>
</tbody>
</table>
Expected Outcome of Low Fat Diet on Lipids

- LDL-C decrease
  - AHA eating pattern: 3 to 15%
  - Strict vegetarian: 35%
- Triglyceride
  - May increase 10-25%
- HDL-C
  - May decrease 5-15% with low SFA
Case: Metabolic Syndrome

56 y. o. male S/P CABG, + GERD, smoking 1 1/2 PPD, eats daily in restaurants; not exercising; + FH

Weight = 212 lb
Height = 70 in glucose 121, 146
BMI = 30.4 Insulin = 19, 44
Waist circa. = 43 in. W/H = 1.1
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cholesterol</td>
<td>238</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>327</td>
</tr>
<tr>
<td>HDL-C</td>
<td>28</td>
</tr>
<tr>
<td>LDL-C</td>
<td>145</td>
</tr>
<tr>
<td>weight</td>
<td>212</td>
</tr>
<tr>
<td>medicine</td>
<td>none</td>
</tr>
</tbody>
</table>
## Identification of Metabolic Syndrome

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Defining level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waist circ.</td>
<td></td>
</tr>
<tr>
<td>men</td>
<td>&gt;40”</td>
</tr>
<tr>
<td>women</td>
<td>&gt;35”</td>
</tr>
<tr>
<td>HDL-C</td>
<td></td>
</tr>
<tr>
<td>men</td>
<td>&lt;40mg/dl</td>
</tr>
<tr>
<td>women</td>
<td>&lt;50mg/dl</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>&gt;100mg/dl</td>
</tr>
<tr>
<td>glucose</td>
<td>≥100mg/dl</td>
</tr>
<tr>
<td>BP</td>
<td>≥ 130/85mmHg or rx Htn</td>
</tr>
</tbody>
</table>
Metabolic Syndrome

Causes

• Acquired causes
  – Overweight and obesity
  – Physical inactivity
  – High carbohydrate diets (>60% of energy intake) in some persons

• Genetic causes
**Metabolic Syndrome**

Management of Overweight and Obesity

- Overweight and obesity: lifestyle risk factors
- Direct targets of intervention
- Weight reduction
  - Enhances LDL lowering
  - Reduces metabolic syndrome risk factors
  - Techniques of weight reduction
Life style causes of Elevated Triglycerides ($\geq 150$ mg/dl)

- Central obesity and overweight
- Physical inactivity
- Excess alcohol intake
- Excess simple carbs
Increase Preferred High Carbohydrate Foods-low glycemic index
Increase preferred high carbohydrate foods-low glycemic index

Eliminate the white foods
Randy Glasbergen
cartoon removed

Original image here: www.glasbergen.com
Keep Intake of Unpreferred High Carbohydrate Foods to a Minimum
Keep Intake of high glycemic index carbohydrate foods to a minimum
Eliminating simple carbs and starches

- Avoid white potatoes, white rice and corn
- Avoid foods from processed flour
  - bread, cake, pasta
- Avoid sweet fruits
- Avoid excessive alcohol
- Avoid sweetened cereals
<table>
<thead>
<tr>
<th></th>
<th>11/10</th>
<th>12/21</th>
<th>3/28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cholesterol</td>
<td>238</td>
<td>189</td>
<td>163</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>327</td>
<td>191</td>
<td>133</td>
</tr>
<tr>
<td>HDL-C</td>
<td>28</td>
<td>26</td>
<td>33</td>
</tr>
<tr>
<td>LDL-C</td>
<td>145</td>
<td>125</td>
<td>103</td>
</tr>
<tr>
<td>weight</td>
<td>212</td>
<td>201</td>
<td>188</td>
</tr>
<tr>
<td>medicine</td>
<td>none</td>
<td>none</td>
<td>Statin+ niaspan</td>
</tr>
</tbody>
</table>
Lifestyle Treatment for Hypertension

- Healthy weight maintenance
- Sodium restriction
- Alcohol restriction
- Exercise
- DASH diet
Photograph of several varieties of food removed
Points to remember

• Anorexia nervosa can cause fatal and non-fatal heart disease
• Central obesity is associated with insulin resistance, multiple coronary risk factors and diabetes
• Alcohol increases HDL cholesterol and can both increase and decrease the risk of heart and vascular disease
• Optimal diet is high in soluble fiber (oats, barley, legumes), fruits, vegetables, micronutrients, fish, and lean meats
• Fish and fish oil can reduce coronary event rates by platelet inhibition and reducing sudden death
Points to remember

- Limiting salt intake to 5 to 6g/day is important in hypertension and congestive heart failure.
- Saline used for intravenous fluids that is 0.9% NaCl, has 0.9g/100ml or 9gm liter.
- Dietary saturated fat intake has the greatest nutritional influence on LDL cholesterol. Intake should be less than 7% of kcal in patients with vascular disease.
- A high intake of simple sugars and refined starches are associated with increase in weight gain and triglycerides.
- Supplemental Vitamin E has not been shown to reduce cardiovascular disease.